

**What is claimed is:**

1           1.           A fatigue safety factor testing apparatus  
2 comprising:

3                   a FEM calculating section which carries out a  
4       5 FEM calculation to meshes of a part to calculate a  
5 stress of each of said meshes of said part;

6                   a normalized stress calculating section which  
7 calculates a normalized stress of a stress applied to  
8 each of said meshes with respect to a fatigue limit as  
9       10 a function of a temperature and material of each of  
10 said meshes; and

11                   a fatigue safety factor calculating section  
12 which calculates a fatigue safety factor of each of  
13 said meshes based on a normalized fatigue limit  
14       15 obtained by normalizing said fatigue limit and said  
15 normalized stress.

1           2.           The fatigue safety factor testing apparatus  
2 according to claim 1, wherein said normalized stress  
3       20 and said normalized fatigue limit are independent from  
4 the temperature and material of each of said meshes of  
5 said part.

1           3.           The fatigue safety factor testing apparatus  
2       25 according to claim 1, wherein said normalized stress  
3 and said normalized fatigue limit are independent from  
4 the temperature of each of said meshes of said part.

1 4. The fatigue safety factor testing apparatus  
2 according to claim 1, further comprising:

3 a function table which stores a conversion  
4 function as a function of the temperature and the  
5 5 material, and

6 wherein said normalized stress calculating  
7 section refers to said function table based on the  
8 material of each of said meshes of said part to  
9 acquire said conversion function, and normalizes said  
10 10 stress applied to each of said meshes of said part  
11 using said conversion function.

1 5. The fatigue safety factor testing apparatus  
2 according to claim 4, further comprising:

3 15 a stress data table which has said fatigue  
4 limit as a function of the material and the  
5 temperature; and

6 a conversion function generating section  
7 which generates said conversion function based on said  
8 20 fatigue limit for every temperature, and stores the  
9 generated conversion function in said function table.

1 6. The fatigue safety factor testing apparatus  
2 according to claim 5, wherein said conversion function  
3 25 generating section generates said normalized fatigue  
4 limit in addition to said conversion function and  
5 stores said normalized fatigue limit in said stress

6 data table in relation to said material, and  
7 wherein said fatigue safety factor  
8 calculating section refers to said stress data table  
9 based on a material of each of said meshes of said  
10 5 part to acquire said normalized fatigue limit.

1 7. The fatigue safety factor testing apparatus  
2 according to claim 1, further comprising:

3 a display section which displays each of said  
4 10 meshes of said part in a color corresponding to said  
5 fatigue safety factor.

1 8. A fatigue safety factor testing apparatus  
2 comprising:

3 15 a normalized stress calculating section which  
4 normalizes a stress applied to a part using a  
5 conversion function for converting fatigue limit for  
6 every temperature of said part and for every material  
7 of said part into a normalized fatigue limit which  
8 20 does not depend on the temperature and outputs as a  
9 normalized stress; and

10 a fatigue safety factor calculating section  
11 which calculates a fatigue safety factor of said part  
12 based on said normalized fatigue limit and said  
13 25 normalized stress.

1 9. The fatigue safety factor testing apparatus

2 according to claim 8, further comprising:

3 a function table which stores said conversion  
4 function, and

5 wherein said normalized stress calculating  
6 5 section refers to said function table based on a  
7 material of each of said meshes of said part to  
8 acquire said conversion function.

1 10. The fatigue safety factor testing apparatus  
2 10 according to claim 9, further comprising:

3 a stress data table which has said fatigue  
4 limit for every temperature and for every material;

5 a conversion function generating section  
6 which generates said conversion function based on said  
7 15 fatigue limit for every temperature and for every  
8 material, and stores the generated conversion function  
9 in said function table.

1 11. The fatigue safety factor testing apparatus  
2 20 according to claims 8, wherein said stress is at least  
3 one of mean stress and amplitude stress applied to  
4 said part, and

5 said fatigue limit shows a permissible mean  
6 stress and a permissive amplitude stress.

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1 12. A method of testing a fatigue safety factor  
2 comprising:

3 (a) acquiring a stress applied to each of  
4 meshes of a part;

5 (b) normalizing said stress using a  
6 conversion function for converting fatigue limit for a  
7 5 material of each of meshes of a part and for every  
8 temperature into a normalized fatigue limit which does  
9 not depend on the temperature; and

10 (c) calculating said fatigue safety factor of  
11 each of said meshes of said part based on said  
12 10 normalized fatigue limit obtained by normalizing said  
13 fatigue limit using said conversion function and said  
14 normalized stress.

1 13. The method of testing a fatigue safety factor  
2 15 according to claim 12, further comprising:

3 (d) determining said conversion function  
4 through the normalization of said fatigue limit;

1 14. The method of testing a fatigue safety factor  
2 20 according to claims 12, wherein said stress is at  
3 least one of mean stress and amplitude stress applied  
4 to said part, and

5 said fatigue limit shows a permissible mean  
6 stress and a permissive amplitude stress.

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1 15. The method of testing a fatigue safety factor  
2 according to claim 12, further comprising:

3 displaying each of said meshes of said part  
4 in a color corresponding to said fatigue safety  
5 factor.

1 5 16. A software product executed by a computer and  
2 recording codes of a method comprising:

3 (a) acquiring a stress applied to each of  
4 meshes of a part;

5 (b) normalizing said stress using a  
6 10 conversion function for converting fatigue limit for a  
7 material of each of meshes of a part and for every  
8 temperature into a normalized fatigue limit which does  
9 not depend on the temperature; and

10 (c) calculating said fatigue safety factor of  
11 15 each of said meshes of said part based on said  
12 normalized fatigue limit obtained by normalizing said  
13 fatigue limit using said conversion function and said  
14 normalized stress.

1 20 17. The software product according to claim 16,  
2 wherein said method further comprises:

3 (d) determining said conversion function  
4 through the normalization of said fatigue limit;

1 25 18. The software product according to claims 16,  
2 wherein said stress is at least one of mean stress and  
3 amplitude stress applied to said part, and

4                   said fatigue limit shows a permissible mean  
5 stress and a permissive amplitude stress.

1           19.       The software product according to claim 16,  
2       5 wherein said method further comprises:

3                   displaying each of said meshes of said part  
4       in a color corresponding to said fatigue safety  
5       factor.